PATENT APPLICATION COVER SHEET
Attorney Docket No. 0435.68174

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Dec. 11, 2003
Date

Express Mail Label No.: EV032735635US

A FASTENER, A FASTENER ASSEMBLY AND A FASTENER ATTACHING DEVICE

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A FASTENER, A FASTENER ASSEMBLY AND A FASTENER ATTACHING DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a fastener and a fastener assembly which can be used for fasteners to be attached to a material sheet or to fasten the material sheets with each other, with or without holding a tag or a label.

More particularly, the present invention relates to a fastener structure, and more particularly to a fastener that is used for the purpose of affixing various labels, including tags indicating brand names, name of material, a method of handling or price, to objects such as clothing, sundry items, footwear, socks and bags, clothes hangers, display shelves, and product display apparatuses, and to fastener that is used to bundle together a number of items of clothing or sundry items as one group of products, and to a fastener structure for supplying the above-noted fastener in the present invention.

2. Description of the Related Art

In the past, one means of attaching a label or tag to a product or bundling a number of products together was the fastener 10 shown in Fig. 8.

The fastener 10, as shown in Fig. 8, comprises a head part 3, a filament 2 that is connected to the head part 3, and a crossbar 1 which is provided on the end of the filament 2 opposite to the end that is connected to the head part 3, and which is approximately perpendicular to the filament 2.

As shown in Fig. 5, a plurality of fasteners 10 are formed in a structure 11 so that they are linked and mutually parallel to one another, after which, for example as shown in Fig. 6, a special fastener attaching device 30, that is a gun, is used to poke and pass

the individual fasteners 10 as they are cut away from the above-noted fastener structure 11, thereby attaching them to a prescribed product or object.

More specifically, as shown in Fig. 7, a fastener structure 11 that is provided at the upper surface of the above-noted fastener attaching apparatus 30 is inserted through a supply aperture 32 of a supply part 31 thereof, so that, as shown for example in Fig. 6, a trigger part 16, for example, an operating lever, is operated, the result being that individual fasteners 10 that are separated away from the fastener structure 11 are respectively inserted into a hollow needle 12. Then they are ejected from an end of the hollow needle, a tip end of which is protruded through a surface of a product or object from the opposite surface thereof, to which the device 30 is facing, thereby attaching the fastener 10 to the product or object.

During this process, the filament 2 of the fastener 10 is guided into the product or object via a slit 33 that is provided in the fastener attaching apparatus 30 and a slit 17 that is provided at the side of the hollow needle 12.

In this prior art, as shown in Fig. 9, the fastener 10 is attached to or anchored on a good 200 to secure a tag or label 400 at the head part 3.

On the other hand, in the past, there has been used a separate type of fastener from the above-mentioned past fastener, which can be used as a fastening or anchoring means as described in the U.S. Patent No. 5,038,931, for example.

In this prior art reference, a configuration of the fastener is different from the above-mentioned past fastener and as shown in Figs. 10 and 11, it is characterized in that the fastener includes first and second connecting bars 130, 132 between which a plurality of fasteners 136 are situated in spaced, parallel relation.

Each one of the fasteners 136 has a first and a second T-bar end 138, 140. Both ends are joined by a flexible filament 139.

As further shown in FIG. 11, the T-bar ends 138, 140 of the fasteners 136 are connected to and spaced from the respective connecting bars 130, 132 by bridge elements 174 which are relatively fine or short.

The bridge elements 174 are long enough to space the T-bar ends 138, 140 from the connecting bar 130, 132 associated therewith a distance sufficient to permit engagement of the bridge element 174 by the gear wheels 178 which make up the indexing mechanism, as shown in FIGS. 2 to 4 of the USP 5,038,931, and the bridge elements 174 cooperate with the teeth of indexing gears 178 to advance the assembly of attachments through the housing, as shown in Fig. 12, corresponding to FIGS. 2 to 4 of USP 5,038,931.

Note that, in this past fastener, each one of the fasteners is shot by a fastener attaching device 30 having two needles as shown in Fig. 10, and which can shoot the fastener 10 one by one as having a mechanism as shown in FIGs. 2 to 8 of USP 5,038,931.

In order to anchor or fasten the fastener 10 as described in USP 5,038,931 to layers of materials 142, 144, such as one being a tag and another being a good such as an article of clothing or the like, which are preferably held in face-to-face relation, the fastener is manipulated such that the T-bars 138 and 140 are respectively pushed by a pair of pushing bars 168 which are operated in response to a movement of the operation lever 16. The pushing bars 168 penetrate through the hollow needles 120 as well as the layers 142, 144 with the needles 120, 122. After the needles 120, 122 have been removed, the T-bar ends 138, 140 remain on one surface of the layers so as to hold the filament part 139 on an opposite surface of the layers, as shown in Fig. 13.

Another conventional fastener and a fastener assembly as well as a fastener attaching device used therefor are also disclosed in the specification and drawings of USP 3,875,648.

However, in this past fastener, since the T-bar has a relatively fine diameter and both end-portions thereof show steep edge, the edge frequently contacts a surface of the respective commercial good so as to damage the surface of the good and accordingly, the quality of the good is sometimes degraded.

On the other hand, since the T-bar has a relatively fine diameter and both end-portions thereof are so steeply edged, when it is used, an operator himself or herself can incur a hand or finger injury from the steep edge portion of the fastener.

In addition to the above-mentioned features, the T end portion of the past fastener is further provided with a flat portion located in a part to which the filament part is connected.

However, an edge portion of this flat portion formed on the T end portion would sometimes destroy a surface of a good such as a fabric or the like so as to deteriorate the quality of the good.

It is, therefore, an object of the present invention to provide a fastener and a fastener assembly which can overcome the above-mentioned drawbacks as seen in the past fasteners.

Another object of the present invention is to provide a fastener attaching device which can be used for attaching the fastener of the present invention to a good to be labeled.

SUMMARY OF THE INVENTION

In one aspect of the present invention, a fastener which is to be attached to a material sheet has a filament portion and at least one bulged massive portion provided on at least one end portion of the filament portion. The bulged massive portion has a maximum length in two directions perpendicular to an axis direction of the

filament portion separated by an angle large enough that the outer surface of the end portion between the two directions is larger than a diameter of the filament portion. The bulged portion can be engaged with one surface of a material sheet, the surface being opposite to the surface through which the filament portion is inserted.

Another aspect of the present invention is a fastener assembly in which a plurality of the above-mentioned fasteners is adjacently arranged to each other, so that each one of the filament portions of the individual fasteners is arranged in parallel fashion.

A third aspect of the present invention is a fastener attaching device, which can be used for attaching each one of the fasteners to a good to be labeled. The fastener attaching device of the present invention shoots fasteners one by one, utilizing a fastener assembly in which a plurality of individual fasteners each have a filament portion and at least one bulged massive portion provided on at least one end portion of the filament portion. Each of the plurality of fasteners is arranged adjacent to each other, in parallel fashion, wherein at least one of the bulged massive portions of each one of the fasteners is simultaneously connected to a connecting bar. The fastener attaching device has a main body, an operating lever, at least one hollow needle provided on an end portion of the main body, a pushing pin passage, and a pushing pin which slides back and forth through the pushing pin passage in response to an operation of the operating lever. A bulged massive portion gripping means and a bulged massive portion supply path for moving the bulged massive portion of a fastener assembly are provided at a position and with a predetermined angle with respect to the pushing pin passage. A connecting bar moving passage is provided inside the main body parallel to the bulged massive portion supply path, and a bulged massive portion supply means for supplying one of the bulged

massive portions to the pushing pin passage in response to an operation of the operation lever is also provided.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1(A) is a drawing illustrating a configuration of a specific embodiment of a fastener of the present invention attached to a good;

Fig. 1(B) is a drawing illustrating a configuration of a specific embodiment of the fastener of the present invention;

Fig. 2(A) is a drawing showing a configuration of one embodiment of the fastener of the present invention which is fastening two layered goods, and Fig. 2(B) is a drawing showing a configuration of another embodiment of the fastener of the present invention which is attaching a good to a label;

Fig. 3 is a drawing illustrating another embodiment of the fastener of the present invention;

Figs. 4(A)-4(K) are drawings illustrating several different kinds of configurations of bulged massive portions which can be used in the present invention, Figs. 4(L) and 4(M) are drawings illustrating a function of a frictional element of the present invention and Figs. 4(N) and 4(O) are drawings of bulged massive portions having grooves that facilitate compression of the bulged massive portions;

Fig. 5 is a drawing illustrating a configuration of a conventional fastener assembly;

Fig. 6 is a drawing illustrating a configuration of a conventional fastener attaching device;

Fig. 7 is a drawing illustrating how to mount the fastener assembly on the fastener attaching device in the past;

Fig. 8 is a drawing illustrating a schematic view of one embodiment of the fastener assembly in the past;

Fig. 9 is a drawing illustrating a conventional fastener which is attaching a tag to a good;

Fig. 10 is a drawing showing a configuration of another embodiment of a conventional fastener attaching device;

Fig. 11 is a schematic view of another embodiment of the fastener assembly used for the fastener attaching device as shown in Fig. 10;

Fig. 12 is an enlarged drawing showing a fastener supplying mechanism of a conventional fastener attaching device as shown in Fig. 10;

Fig. 13 is a drawing showing how to fasten a plurality of layered goods with the conventional fastener as shown in Fig. 11;

Figs. 14(A) to 14(E) are drawings each showing a configuration of various embodiments of the fastener assemblies of the present invention;

Figs. 15(A) to 15(D) are drawings showing one embodiment of an indexing system as used in the present invention;

Figs. 16(A) and 16(B) are drawings showing a configuration of one embodiment of the fastener attaching device of the present invention;

Fig. 17 is a plan view showing a configuration of another embodiment of the fastener attaching device of the present invention;

Fig. 18 is a schematic view showing a configuration of another embodiment of the fastener attaching device of the present invention as shown in Fig. 17;

Figs. 19(A) to 19(C) are drawings showing various embodiments of a bulged massive portion gripping means as used in the present invention;

Figs. 20(A) and 20(B) are drawings showing a relationship between the pushing pin and the bulged massive portion gripping means as used in the present invention;

Figs. 21(A) and 21(B) are drawings showing configurations of the over all mechanism of or a part of one embodiment of the pushing pin driving means used in the present invention;

Figs. 22, Figs. 23(A) and 23(B) are drawings illustrating how the pushing pin driving means as shown in Figs. 21(A) and 21(B) works;

Fig. 24 is a drawing showing a configuration of one embodiment of the cutting means as used in the fastener attaching device of the present invention;

Fig. 25 is a plan view showing a configuration of a further separate embodiment of the fastener attaching device of the present invention;

Figs. 26(A) and 26(B) are drawings showing configurations of one embodiment of the bulged massive portion supply means used in the fastener attaching device of the present invention as shown in Fig. 25;

Figs. 27(A) to 27(D) are drawings showing detailed configurations of the bulged massive portion supply means as shown in Fig. 26(A);

Figs. 28(A) to 28(C) are drawings showing how to operate the bulged massive portion supply means used in the fastener as shown in Fig. 27(A);

Figs. 29(A) and 29(B) are drawings showing configurations of a separate embodiment of the fastener attaching device of the present invention; and

Figs. 30(A) and 30(B) are drawings showing configurations of further separate embodiment of the fastener attaching device of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of a fastener and an assembly of the fasteners according to the present invention are described in detail below, with references being made to the relevant accompanying drawings.

Fig. 1 (A) generally illustrates an example of a fastener 10 according to the present invention.

The fastener 10 is shown attached to at least one material sheet 7 or 8 such as a good to be labeled, as shown in Fig. 2 (A) or Fig. 2(B). The fastener 10 includes a filament portion 2 and at least one bulged massive portion 3 provided on one end portion of the filament portion 2. The bulged massive portion 3 has a maximum length B in at least two directions perpendicular to an axial direction of the filament portion 2, as in a sphere or the like. Vectors (V1, V2) of the two directions could be 90° to each other or less, provided the angle formed by the vectors creates an outside surface on the portion 3 that is larger than the diameter of the filament.

The length B is larger than an diameter A of the filament portion 2. The bulged massive portion 3 can be engaged with one surface of a material sheet 7 or 8, the surface of which is opposite to a surface thereof through which the filament portion 2 is first inserted.

On the other hand, Fig. 1 (B) shows the fastener 10 of the present invention in which the fastener 10 is provided with at least two bulged massive portions 3 and 3' on both end portions of the filament 2, respectively.

In another embodiment of the fastener 1 according to the present invention, a tag holding portion 6 is provided at another end

of the filament portion 2 opposite to the end to which the bulged massive portion 3 is connected, as shown in Fig. 3.

Further, in a fastener 1 according to the present invention, the bulged massive portion 3 having a configuration selected from a group consisting a spherical configuration (Fig. 4(A)), a semi-spherical configuration (Fig. 4(B)), a cone like configuration (Fig. 4(C)), a pyramid type configuration (Fig. 4(D)), a truncated cone (Fig. 4(E)) or pyramid type configuration (Fig. 4(F)), a polygonal sphere (Fig. 4(G)) or polygonal semi-sphere, and an ellipsoid configuration (Fig. 4(H)) or the like.

In addition to the above-mentioned shapes, the bulged massive portion 3 has a part opposing the surface of the sheet material 7 or 8 on which at least one frictional element 11 against the surface of the sheet material 7 or 8 in Figs. 2(A) and 2 (B), being provided as further shown in Figs. 4(I), 4(J) and 4(K).

In the present invention, it is preferable that the frictional element 11 be one selected from a group consisting a groove or a concave portion 11-1, a convex portion or a projected portion 11-2 from the surface of the bulged massive end portion 3, a flat like portion 11-3, a blade like portion 11-4 or the like.

When the blade like portion 11-4 is used on the bulged massive portion 3 of the present invention, it is preferable that the blade like portion 11-4 be formed on a surface of the bulged massive portion 3 integrally with the same material as used for the bulged massive portion 3.

And further, as shown in Fig. 4(L) and 4(M), it is also preferable that the blade like portion 11-4 and even the bulged massive end portion itself be flexible and resilient so that when moved inside a hollow needle, a diameter W1 of a peripheral circle formed by outer edge portions of a plurality of the blade like portions 11-4 and/or the outer surface of the bulged massive end portion 3

is smaller that an inside diameter W0 of the hollow needle 12 but when it is pushed out of the hollow needle 12, the diameter W2 of a peripheral circle formed by outer edge portions of a plurality of the blade like portions 11-4 is enlarged to a certain value exceeding a diameter W4 of the bulged massive portion 3 or exceeding an inside diameter of a hole formed on the sheet or layer by the hollow needle 12.

A bulged massive portion 3 having concave portions 11-1 is shown in greater detail in Figs. 4(N) and 4(O). An additional concave portion 11-5 is also provided. In the figures, the concave portions 11-1 are adjacent the filament 2, and the concave portion 11-5 is at the end of the bulged massive end portion opposite the filament 2. When these or other suitable concave structures are used, the bulged massive portion 3 can be compressed in the needle 12, as seen Fig. 4(N), by making a width W5 of the needle 12 smaller than the width W6 of a fully released bulged massive portion 3 (Fig. 4(O)). In this manner, the bulged massive portions 3 can be compressed when they are inserted through a fabric, and released to the larger diameter W6 after installation. The concave portions 11-1 and 11-5 can be used with or without the frictional elements 11-4.

In the present invention, the fastener of the present invention has a bulged massive portion 3 provided on at least one of the end portions of the filament portion 2, and a diameter thereof is larger than the diameter of the filament portion 2. However, the diameter of the portion 3 is also larger than a diameter of a hollow needle of a conventional fastener attaching device used for the fastener having the above-mentioned T-bar end portion.

That means that generally speaking, when the fastener of the present invention is attached to a good to be labeled or fastened, a through hole having a relatively large diameter is necessarily formed in a fabric, leather, film, sheet or the like of the good, the diameter of

which is larger that that of a through hole which would be formed in a good by a conventional fastener attaching device.

Accordingly, in the present invention, the fabric, leather, film, sheet or the like consisting the good to be fastened or labeled may itself have a flexibility, elasticity, or resiliency so that when the hollow needle is removed from the hole, the diameter of the hole is reduced so as to prevent the bulged massive portion from being dropped out from the hole.

In the present invention, the filament portion 2 of the present invention may have a length suitable to be used for an applied good 7 or 8 (Fig. 2(A).

The length of the filament portion 2 is not restricted to a specific length but it is preferably from 5 mm to 100 mm.

Further, in the present invention, a diameter A of the filament portion of the fastener 2 (Fig. 1(B) is preferably between 0.1 to 1.5 mm, while the length or diameter B of the bulged massive portion 3 and which is perpendicular to an axis of the filament portion 2, should be larger than that of the filament portion 2.

And in the present invention, the ratio of A/B is not basically restricted to a specific figure but it preferably falls in a range between from 40% to 60%.

Figs. 14(A)-14(E) show other embodiments of the present invention.

Fig. 14(A) and 14(B) disclose a fastener assembly 15 in which a plurality of the fasteners 10 as shown in Fig. 1(B) are adjacently arranged to each other, so that each one of the filament portions 2 of the individual fasteners 10 being arranged parallel to each other with a constant pitch formed therebetween. Fig. 14(C) and 14(D) disclose a fastener assembly 15 in which a plurality of the fasteners 10 as shown in Fig. 3 are arranged adjacent to each other, so that each one of the filament portions 2 of the individual fasteners 10

are arranged parallel to each other with a constant pitch formed therebetween.

In fastener assembly 15 according to the present invention, at least one of the bulged massive portions 3 or 3' of each one of the fasteners 1 is simultaneously connected to a rail 13.

Further in the fastener assembly 15 of this embodiment, both of the bulged massive portions 3 and 3' provided at both end portions of the filament portion 2 of the respective fasteners 10 are simultaneously connected to both rails 13 and 13', each being arranged parallel to each other.

In the fastener assembly 15 of another embodiment of the present invention, the bulged massive portions 3 provided on one of the end portions of the filament portion 2 are simultaneously connected to a first connecting bar 13, while each one of the tag holding portions 6 provided on another end portion of the filament portions 2 are simultaneously connected to a second rail 13', or the tag holding portions 6 are connected to each other with a suitable connecting rod 104, as shown in Fig. 14(E).

In addition to the above-mentioned, either one of the bulged massive portions 3 or the tag holding portions 6 are connected to the respecting rail 13 or 13', via a connecting portion 4 which is provided on the rail 13 or 13'.

Further, in the fastener assembly 15 of the present invention, the connecting portions 4 have a configuration in that an external diameter thereof is gradually reduced from a bottom portion thereof directly connected to the rail 13 to a contacting area with either one of the bulged massive portion 3 or 3' and the tag holding portion 6.

In the fastener assembly 15 of the present invention, the connecting portion 4 is connected with either one of the bulged massive portion 3 and the tag holding portion 6 through a point

contacting portion 14, and it is preferable that at least one of the rails 13 and 13' provided with an indexing system 20 (Fig. 15(A). The indexing system 20 can have a concaved portion, a projected portion or a hole portion formed on a surface of the rail. In Figs. 15(A) and 15(B) the indexing system 20 has a plurality of holes 21 provided along the rails 13, 13'.

In the present invention, all portions of the fastener assembly can be integrally formed into one body with plastic resin material, such as Nylon, Polyester, polyurethane, poly-propylene or the like, through a molding method.

Next, a specific embodiment of a fastener attaching device of the present invention will be explained hereunder with reference to the drawings.

Figs. 16(A) and 16(B) show a configuration of one embodiment of the fastener attaching device of the present invention.

In Fig. 16(A), there is shown a fastener attaching device of the present invention in which the device 30 can shoot fasteners 10 one by one from a fastener assembly 15. The fastener 15 includes a plurality of unit fasteners 10 each having a filament portion 2 and at least one bulged massive portion 3 provided at least at one end portion of the filament portion 2. Each of the plurality of the fasteners 10 are adjacently arranged to each other, so that each one of the filament portions 2 thereof are arranged in parallel with each other. At least one of the bulged massive portions 3 of each one of the fasteners 10 is simultaneously connected to a rail 13.

The fastener attaching device 30 is provided with a main body 23, an operating lever 16, at least one hollow needle 12 provided on an end portion of the main body 23, a pushing pin passage 42, and a pushing pin 41 which slides through the pushing pin passage 42 back and forth in response to an operation of the operating lever 16. The device also has a bulged massive portion gripping means 43,

bulged massive portion supply path 44 for moving the bulged massive portion 3 of a fastener assembly 15, provided at in a vicinity of the pushing pin passage 42 and intercrossing with a predetermined angle with the pushing pin passage 42, a connecting bar moving passage 45 provided inside the main body 23 in parallel with the bulged massive portion supply path 44, and a bulged massive portion supply means 46 for supplying one of the bulged massive portions 3 uniformly and periodically to the pushing pin passage 42 in response to an operation of the operation lever 16.

On the other hand, one example of the bulged massive portion supply means 46 of the present invention is shown in Fig. 16(B). The specific bulged massive portion supply means 46 of the present invention comprises a rotary gear wheel which is provided with a plurality of gear teeth 47 on a peripheral surface thereof, each being arranged thereon with a uniform interval.

The gear teeth 47 of the bulged massive portion supply means 46 can engage with the above-mentioned indexing means 20, which has a plurality of the connecting portions 4, as shown in Fig. 14(A), or a plurality of holes 21 which are provided on a side surface of the rails 13, as shown in Figs. 15(A) to 15(D).

In the present invention, the pitch of the indexing means and the pitch of the gear teeth 47 of the bulged massive portion supply means 46 are easily engaged with each other and thus when the gear teeth 47 of the bulged massive portion supply means 46 are rotated by a predetermined rotating angle, one selected bulged massive portion 3 is moved by a predetermined length in a down-ward direction and thus one bulged massive portion 3 is placed in an intersection point 48 formed between the bulged massive portion supply path 44 and the pushing pin passage 42. The bulged massive portion 3 then is pushed inside of the hollow needle 12 by the pushing pin 41 and finally it is pushed out from the hollow needle 12.

In this embodiment of the present invention, an inside diameter of the hollow needle 12 as well as that of the pushing pin passage 42 are substantially identical to or minimally larger than an external diameter of the bulged massive portion 3.

On the other hand, the pushing pin 41 is moved along the pushing pin passage 42 back and forth within a predetermined range in response to a movement of the operation lever 16 via a conventional mechanical driving system 50 provided therebetween.

When a fastener assembly 15 as shown in Fig. 14(E) is mounted on the fastener attaching device 30 by inserting the rail 13 and the bulged massive portion 3 into the connecting bar moving passage 45 and the bulged massive portion supply path 44, respectively, and a first fastener 10 is set at a shooting position of the device 30 so that the first bulged massive portion 3 of the first fastener 10 is placed inside of the pushing pin passage 42 at the position 48, by operating the operation lever 16, the above-mentioned movement is carried out so that the bulged massive portion 3 is pushed out of the hollow needle 12.

After that, when the operation lever 16 is returned to its original position, the bulged massive portion supply means 46 is actuated so as to be rotated by a predetermined angle to thereby move the second bulged massive portion 3 of the second fastener 10 to the above-mentioned shooting position automatically.

Note that, in the present invention, the bulged massive portion supply means 46 has a configuration in that the bulged massive portion supply means 46 can supply a bulged massive portion 3 to the pushing pin passage 42, before the bulged massive portion gripping means 43 which is provided at a tip end portion of the pushing pin passing by the intercrossing portion 48 formed between the bulged massive portion supply passage 44 and the pushing pin

passage 42, in response to an operation of the operation lever 16, in the vicinity of the bulged massive portion supply means 46.

In Fig. 16(B), the angle formed between the bulged massive portion supply passage 44 and the pushing pin passage 42, is set at a right angle, i.e., 90 degree, for example.

In this embodiment, the pushing pin 41 may directly contact the bulged massive portion provided inside the pushing pin passage 42, but alternatively it may have a bulged massive portion gripping means 43 at a tip end portion of the pushing pin passage 42, as a separate member and the bulged massive portion gripping means 43 may directly contact the bulged massive portion 3 and push it through inside of the pushing pin passage 42, in response to a movement of the pushing pin 41.

Either one of the tip end portion of the pushing pin 41 or the bulged massive portion gripping means 43 may accept a part of the bulged massive portion 3 inside thereof and keep it stable while it is transferred inside the pushing pin passage 42.

In order to perform the above-mentioned function, the tip end portion thereof may have a configuration as shown in Figs. 19(A) to 19(C), for example.

Note that Fig. 19(A) shows a configuration of the tip end portion of the pushing pin or the bulged massive portion gripping means 43, in that a groove 193 formed by two flat surfaces 191 and 192 is provided. Fig. 19(B) shows a configuration thereof in that two curved edge portions 194 and 195 are provided with a curved space 196 formed inside thereof. Further, Fig. 19(C) shows a configuration in which a plurality of edge portions 197 are provided.

Note that, in the present invention, as mentioned above, the bulged massive portion gripping mean 43 may be provided with a portion for covering at least a part of a surface of the bulged

massive portion, with a space inside thereof for accepting the surface of the bulged massive portion part 3 therein.

In the present invention, the connecting portion 4 formed between the bulged massive portion 3 and the rail 13 is preferably made weak so that it can be easily broken by a shearing force applied thereto when the pushing pin 41 pushes the bulged massive portion 3 forward

On the other hand, in order to cut the connecting portion 4, a separate cutting means 49 for cutting the connecting portion 4 can be provided on this device 30, the a vicinity of the above-mentioned intercrossing portion 48.

The cutting means 49 can be a conventional blade type knife edge or other suitable cutting means which enable the cutting operation to be positively performed in response to an operation of operation lever 16.

One example of this cutting means is shown in Fig. 24 in that a cutting means comprising a shearing edge is provided along the connecting bar 13. Also shown in Fig. 24 is that the filaments 2 are longer than the distance between the rails 13, 13', which creates the appearance of slack in the filaments before installation. This slack makes installation of the fasteners 10 easier. As another embodiment about this cutting means 49, the cutting means can be provided at at least a part of the bulged massive portion gripping means 43, which can work in response to an operation of operation lever 16.

As mentioned above, in the present invention, when the bulged massive portion gripping means 43 is additionally used with the pushing pin 41, the bulged massive portion gripping means 43 may be directly connected to a tip end portion of the pushing pin 41. It may also be provided separately, in which case, the bulged massive

portion gripping means 43 and the pushing pin 41 perform their respective sliding motions inside the pushing pin passage 42.

In this embodiment, at a first stage of the fastener shooting operation, the bulged massive portion gripping means 43 serves as to stably capture the bulged massive portion 3 and remove it from the rail 13 by cutting off the connecting portion 4 and stably pushing and transferring the bulged massive portion 3 into the hollow needle 12, as shown in Fig. 20(A).

In the second stage thereof, the pushing pin 41 moves forward beyond the bulged massive portion gripping means 43 by penetrating through the bulged massive portion gripping means 43 so as to push out the bulged massive portion 3 from the hollow needle 12, as shown in Fig. 20(B).

A detailed configuration thereof and its operation will now be explained.

Another embodiment of the fastener attaching device 30 of the present invention is shown in Figs. 17 and 18.

In this embodiment, a fastener attaching device 30 which can be used for the fastener assembly 15 shown in Figs. 14(A) to 14(C) is shown. As is apparent from these figures, most of the constructional elements as used in the previous embodiment of the device 30 as shown in Fig. 16 are also provided therein.

Note that the fastener attaching device 30 of this embodiment is used for a fastener assembly in which a plurality of unit fasteners 10 each comprising a filament portion 2 and two bulged massive portions 3, 3' provided at both end portions of the filament portion 2. Each of the fasteners 10 is adjacently arranged to each other, so that each one of the filament portions 2 thereof are arranged in parallel with each other. The device 30 is provided with a pair of the hollow needles 12, 12', a pair of the pushing pins 41, 41', a pair of the pushing pin passages 42, 42', a pair of the bulged massive

portion gripping means 43, 43', a pair of the bulged massive portion supply paths 44, 44', a pair of the connecting bar moving passages 45, 45'and a pair of the bulged massive portion supply means 46, 46'.

As is apparent from Fig. 17, showing a plan view of the fastener attaching device of this embodiment, all of the two respective constructional elements in pair, for example, a first bulged massive portion supply path 44 and a second first bulged massive portion supply path 44' or the like, are provided at respective positions each being oppositely arranged to each other and being symmetrical to each other with respect to a center axis 52 of the fastener attaching device 30.

In this embodiment, the operations of each one of the constructional elements of the device 30 are completely identical to those constructional elements as used in the previous embodiment 30, as shown in Figs. 16(A) and 16(B). Thus, explanations about operations of each one of the elements are omitted for this embodiment. The technical feature of this embodiment that differs from that of the previous embodiment is that both of the bulged massive portions 3 and 3' are simultaneously attached to the good shown in Fig. 2(A).

Fig. 25 shows a further separate embodiment of an attaching device 30 of the present invention in which a fastener assembly 15 is mounted with a certain angle with respect to a longitudinal center axis of the device 30.

More precisely, the fastener attaching device 30 according to this embodiment is characterized in that when the fastener assembly 15 is to be mounted on the device 30, the fastener assembly 15 is mounted thereon so that a direction 55 along which each one of the filament portions 2 of the respective fasteners 10 in the fastener assembly 15 are arranged is set so as to intercross with

the center axis 56 (which is parallel to a center axis 57 of the pushing pin path 42) and the hollow needle 12 with a predetermined angle θ .

In this embodiment, a value of the predetermined angle θ is not restricted to a specific value but it can be set at a desired value with respect to a field to which the device 30 can be applied.

Note that, in this embodiment, a width of the main body 23 of this device 30, as measured perpendicular to the center axis 56 of this device 30, can be reduced so that a weight of device 30 as well as a production cost therefor will be reduced. In addition, the operation for shooting the fasteners utilizing this device 30 will be easy and simplified.

Further in this embodiment, the pushing pins 41, 41' as well as the bulged massive portion gripping means 43, 43'can be provided at the same positions oppositely arranged to each other, as shown in Fig. 25 or one of the pushing pins 41 or 41' may be offset to be closer to the needle 12 by a certain amount of length.

Further note that as is apparent from Fig. 25, in the fastener attaching device 30 of this embodiment, a pair of the bulged massive portion supply paths 44 and 44' as well as a pair of the pushing pin passages 42 and 42', are oppositely arranged to each other with respect to the center axis 56 of this device 30 in an oblique condition.

In this embodiment, the device 30 may use a specifically embodied bulged massive portion supply means 46, as shown in Figs. 26(A) and 26(B), which has a pair of rotating members 58, 58' each having a plurality of fastener engagement members 59, 59' on a peripheral surface of each of the rotating members 58, 58', which can engage a predetermined portion of each one of the unit fasteners so as to move the unit fasteners 10 by a predetermined distance in a predetermined direction.

In this embodiment, the rotating members 58, 58' are a pair of circular plates, as shown in Fig. 26(B).

Note that, in this embodiment, each one of the fastener engagement members 59, 59' can engage with each one of a plurality of holes 21 which are provided in the rails 13 and 13' as an indexing system 20. The holes are formed in each one of the rails 13, 13' with a uniform pitch which is identical to a pitch formed between the bulged massive portions 3.

Thus, when the rotating members 58, 58' are rotated with a predetermined rotational angle, the fastener engagement members 59, 59' can move each one of the fasteners 10 by a predetermined distance in a predetermined direction.

More specifically, in the present invention, as shown in Fig. 26(B), the fastener assembly 15 is set on the device 30 so that a common rotating axis 60 of the rotating members 58, 58' intercrosses with a direction 55 along which each one of the filament portions 2 consisting the fastener assembly 15 are arranged, with a certain angle.

Therefore, in this embodiment, one of the rails 13 can connect with the fastener engagement members 59 of the rotating members 58 at one side position with respect to the center axis 60, while another rail 13' can connect with the fastener engagement members 59' of the rotating member 58' at an opposite side position with respect to the center axis 60.

And accordingly, when both of the rotating members 58, 58' are rotated in different directions from each other, both of the rails 13, 13' can be moved in the same direction to each other.

In this embodiment of the present invention, a pair of the rotating members 58, 58' may be rotated by a common driving member 61 which is driven by a suitable mechanism in response to an operation of an operation lever 16, so that the rotating directions of

each one of the rotating members 58 and 58' are different from each other.

Further note that a rotational axis of the common driving member 61 is preferably set at a direction perpendicular to the rotational common axis 60 of the rotating members 58 and 58'.

Further precise explanation about this embodiment will be done hereunder with reference to Figs. 27 and 28.

Fig. 27(A) is a plan view of one embodiment of the bulged massive portion supply means 46 of the present invention as shown in Fig. 26, while Fig. 27(B) is a side view of the bulged massive portion supply means 46.

As is apparent from Figs. 27(A) and 27(B), each one of the pair of pushing pins 41 are respectively connected to a part of the driving mechanism 50 which can be driven in response to a movement of the operation lever 16, so that both of the pushing pins 41 and 41' are moved back and forth inside of the pushing pin passage 42.

On the other hand, as shown in Figs. 27(B) and 27(C), both of the rotating members 58 and 58' are connected to a common driving member 61 which is a rotating gear wheel, for example, and which can be rotated with a ratchet gear wheel 65 driven by a feed pawl 63 engaging with the ratchet gear wheel 65. The feed pawl 63 may be driven by the driving mechanism 50, which works in response to movement of the operation lever 16.

Fig. 27(C) is a backside view of the bulged massive portion supply means 46 and Fig. 27(D) is a front view of the bulged massive portion supply means 46.

Figs. 28(A) to 28(C) are back side views of the embodiment of the bulged massive portion supply means 46 of the present invention and also show how to work the bulged massive portion supply means 46 in response to movement of the operation lever 16.

Fig. 28(A) shows a configuration of the relationship among the elements used therein when the bulged massive portion 3 has been pushed out from the hollow needle 12, that is, when the operation lever 16 has been maximally displaced from its original starting position.

At this moment, a slider 66 which is moved by the driving mechanism 50, which in turn is driven in response to the operation lever 16, is located at the most forward position. Thus, the feed pawl 63 is lifted upwardly by a projected portion 67 provided on the slider 66, so that the ratchet portion 68 provided at the end portion of the feed pawl 63 is removed from the gear tooth 69 of the ratchet gear 65 connected to the common driving member 61.

In the next step, as shown in Fig. 28(B), by releasing the power applied to the operation lever 16, when the slider 66 is returned to a middle position from the most forward position thereof, the feed pawl 63 descends from the lifted position so that the ratchet portion 68 comes into contact with the gear tooth 69 of the ratchet gear.

Further in the third step, as shown in Fig. 28(C), when the slider 66 is fully returned to the original position, the feed pawl 63 is moved with the movement of the slider 66 in the left hand direction, so that the ratchet portion 68 of the feed pawl 63 and is engaged with the gear tooth 69 of the ratchet gear 65, rotates the ratchet gear 65 by a predetermined rotational angle.

And accordingly, the common driving member 61 connected to the ratchet gear 65 is rotated by a predetermined rotational angle, so that a pair of the rotating members 58, 58' can be rotated in a different rotating direction from each other, causing both of the rails 13 and 13' to be moved downwardly.

Next, a specific configuration of the above-mentioned embodiment of the present invention, in which both the pushing pin

41 and the bulged massive portion gripping means 43 are used, is explained with reference to Figs. 21 to 23.

In this embodiment, the root portions of the hollow needles 12, 12' are supported inside the main body 23 of the device 30 via needle entry receptacles 70 and 70' as shown in Fig. 21(A).

Additionally, the bulged massive portion gripping means 43 includes a cutting member 49 which is disposed at a part of a tip end portion thereof, and has a shearing edge 71. Thus, in this embodiment, when the bulged massive portion gripping means 43 is moved forward beyond the bulged massive portion supply means 44, the shearing edge 71 of the bulged massive portion gripping means 43 can break the connecting portion 4 formed between the connecting bar 13 and the bulged massive portion 3.

As shown in Fig. 21(A), a pair of hollow bulged massive portion gripping means 43 and 43' as shown in Fig. 20 are supported on a first slider means 73. The center axis of each one of the hollow bulged massive portion gripping means 43 and 43' are set coaxially with the center axis of each one of the hollow needles 12 and 12'. The first slider means 73 has a base plate 78 having a hole through space 77 on a part of the base plate 78, and a control means 72 which controls movement of the first slider means with respect to the movement of a second slider means 50 as a driving mechanism, which will be explained.

The control means 72 includes a rod portion 79 extended from the first slide means 73 and a stopper member 80, which drives the first slider means 73 or stops the movement of the first slider means 73.

On the other hand, end portions of a pair of the pushing pins 41 and 41' are fixed on a surface of a second slider means 50, and other end portions thereof are inserted into the hollow portions of the bulged massive portion gripping means 43.

In this case, the second slider means 50 is connected to a base driving member 75, which is connected to the operation lever 16 via a conventional link mechanism. The second slider means 50 can slide along the hole through space 77 provided in the base plate 78 of the first slider means 73, if engagement between the second slider means 50 and the stopper member 80 formed on the controlling means 72, is broken.

Note that in this embodiment, the over all portions of the first slider means 73 and the second slider means 50 are simultaneously moved in the forward direction when the stopper member 80 is engaged with a part of the second slider means 50. The base driving member 75 is moved in the forward direction directing the hollow needles 12 and 12'.

This operation is shown in Fig. 22.

Note that, when the second slider means 50 is moved forward, such as in the direction of the hollow needle 12, since the stopper member 80 of the control means 72 provided on the first slider means 73 is engaged with the second slider means 50, the pushing pin 41 and the first slider means 73 are simultaneously moved in the same direction and thus the bulged massive portion gripping means 43 and 43' are also moved forward, so as to reach the intercrossing point 48. Then the bulged massive portion gripping means 43 and 43' capture the bulged massive portions 3 and 3' with the concave portion formed by the edge portions provided at the tip end portions of the bulged massive portion gripping means 43.

And thereafter, as shown in Fig. 23(A), by further successive forward movement of the second slider means 50, the bulged massive portion gripping means 43 and 43' take the bulged massive portion 3 and 3' off from the rails, respectively, by cutting the connecting portion 4 and 4' with the cutting means provided on the bulged massive portion gripping means 43 and 43' or another

cutting means provided on the main body 23 of the fastener attaching device 30.

In the next step, as shown in Fig. 23(B), when the stopper member 80 of the control means 72 is sliding inside of the pushing pin passage 42 in contact with to an inside surface of the pushing pin passage 42, and comes into a position at which a hole portion 81 is provided on a body wall of the pushing pin passage 42, the stopper member 80 is inserted into the hole portion 81 and thus the engagement formed between the stopper member 80 and the second slider means 50 is removed, causing the movement of the first slider means 73 to be stopped.

The second slider means 50 continues advancing forwardly through the hole through space 77 provided on the base plate 78 of the first slider means 73, and thus the pushing pin 41 kept inside the bulged massive portion gripping means 43 goes beyond the bulged massive portion gripping means 43 so that the bulged massive portion 3 held by the bulged massive portion gripping means 43 is pushed into the hollow needle 12 and finally it is pushed out of the hollow needle 12.

Thereafter, the second slider means 50 is returned back to an original position by releasing the force applied to the operation lever 16. On its way back to the original position, until the second slider member 50 has passed through under the locked stopper member 80, only the second slider means 50 is moved backwardly, while the first slider means 73 is kept in stationary condition.

Then, when the second slider means has passed through under the locked stopper member 80, the locked stopper member 80 is released from its locking condition with the hole through space 81.

By this time, the second slider means 50 with the base driving member 75 has reached the end portion of the hole through space 77 provided on the base plate 78 of the first slider means 73, as

shown in Fig. 21. The second slider means 50 with the base driving member 75 continues to move backwardly to the original position so that both of the first and the second slider means 73 and 50 are returned to their original position, simultaneously.

Figs. 29(A) and 29(B) shows one of the embodiments of the fastener attaching device 30 of the present invention in which the main body 23 of the device 30 is provided with a cartridge member 90 which contains a rolled fastener assembly 10 and from which the fastener assembly 10 is withdrawn to the bulged massive portion supply path 44 and the connecting bar moving passage 45 with slight twisting of the fastener assembly 10 therebetween.

Fig. 30 shows another embodiment of the device 30 of the present invention, in which the cartridge member 90 is installed on the main body 23 with its rotational axis 91 being inclined at a certain angle from a surface direction 92 formed by two hollow needles 12 and 12'.